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" *To the solid ground*
Of Nature trusts the mind which builds for aye."—WORDSWORTH.

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THE IMPERIAL GAZETTEER ATLAS OF INDIA.

The Imperial Gazetteer of India. Vol. xxvi. Atlas. New edition. Pp. vii+45; 64 plates. (Oxford: Clarendon Press, 1909.)

THIS atlas, which forms the twenty-sixth volume of the series, is practically an epitome of all the information contained in the "Gazetteer," and, as such, it presents to the reader in a concrete form of illustration most of the physiographical conditions of the Indian Empire. The authorities for the information contained in it are of the very highest, and the publisher is Mr. J. G. Bartholomew, which is in itself a guarantee that the maps are of the very best. Geology, meteorology, ethnology, language distribution, and archæology are all included; there are four special maps illustrating the position of the British frontier at different periods, and a series of admirable city maps which might have been extended with advantage.

In the first general map which presents itself the singular position of Ceylon as forming no part of the Indian Empire is curiously anomalous; and inasmuch as Ceylon cannot be wholly left out of account (as in the railway maps, for instance), it would, we think, have added to the appearance, if not to the usefulness of the atlas, to have included it generally. With this doubtful exception the general maps are complete, clear, and most instructive. The special maps are also good, although, of course, it would be easy to suggest other and possibly better methods of presenting the physical features of India than those which have been adopted. The one special map which deals with the subject of vegetation is perhaps the most open to criticism. Here the classification of area by colour, exhibiting the nature of vegetable growth, or the want of it, seems inadequate. There is one green tint in particular, which denotes "grass or sparsely cultivated," which is rather too comprehensive. We find it, for instance, covering wide tracts to the north and south of the Indravati affluent of the Godavari river in the Central Provinces. Undoubtedly this is a grass country, and it is also sparsely cultivated. The grass in the cold-weather seasons is thick and rank along the low-lying flats, bunched with tangled masses of dew-soaked undergrowth, and almost impassable in the hot weather by reason of the stuffy atmosphere which envelops it; but it is always associated with a low scrub (chiefly of various species of dwarf palm) and sheltered by a more or less scattered tree jungle which occasionally rises to the dignity of forest and is never altogether wanting although it thins out on the higher land. This is, in fact, the nature of the "jungle" which covers half the surface of India, distinct from the official forest areas, which contain timber of commercial value or fringe the foot-hills of the Himalayas.

Again, we find the same tint of green overlying many hundreds of square miles of the Baluch highlands where never a tree has been seen for a century, and where it would be vain to look for a blade of grass after the close of summer. It is true that in the spring months a green tint does actually steal gradually over the hill-sides, and it fills in the spaces between the wormwood scrub of the flats. Then, indeed, the flowers bloom freely, and for a period Baluchistan is gay. Then, too, the shepherd takes his sheep to the hills, and the landscape becomes dotted with white specks of scattered flocks. There is grass undoubtedly —for a time—and equally true it is that the land is "sparsely cultivated"; but about the season that the Indravati basin is rank with cane-brakes and undergrowth and swarming with game, the hills of Baluchistan take on their normal aspect of dead, dull stony desolation, and the "dasht" becomes grey and insipid. So far as vegetable growth is concerned the two countries are in utter contrast, although it is true of both that grass grows in them, and that cultivation is sparse. A very considerable extension of the "steppe-desert" tint is required in Baluchistan (where it is not introduced at all), nor is it quite reasonable to ignore the magnificent cultivation of the valleys of the Hari Rud, near Herat, and of the Helmand; or to paint the summit of the Sulaiman range with the colour

of the "sandy desert or barren land," considering that the chilghosa forests of these mountains (which are all about these summits) are of great economic importance to the tribes people who make use of them. It will be observed that these criticisms point, not to the maps of India with which the "Gazetteer" is principally concerned, but to the maps of the Indian frontier and trans-frontier. Of the maps of India it is enough to say that they are all admirably clear and most instructive, each in its distinct and separate line of illustration; but inasmuch as the frontier is now very rightly included in all works dealing seriously with Indian problems, it is time that the public were supplied with map information of a class equal to that of the Indian peninsula generally. This is not quite the case in this atlas.

Take, for instance, the map of Baluchistan amongst the "district" series. Were no attempt made at reproducing the orography of that remarkable country the map might pass sufficiently well as a sketch; but the crude representation of the mountain features which at present disfigures the map is absolutely misleading. All the beauty (and it is very beautiful) of nature's arrangement of sweeping flexures and folds which border the trans-Indus highlands; the orderly curves of their looping up where the inset of the Kach Gandava desert occurs (just like the looped-up flexures in hanging drapery) pushing back and forming the massive mountain entourage of Quetta; then sweeping away in graceful flexures seamed with a thousand wrinkles to Karachi, or through Makran to Persia—all this is lost in the graceless disposition of a few fat slug-shaped forms over the yellow surface of the map. This is not the orography of Baluchistan, or Makran, and it is misleading. The traveller who trusted, by following this map, to turn the northern end of the Kirthar range and to walk into Khozdar on the flat plains would be grievously disappointed. The wall of the frontier hills is not even represented as continuous, and even if the scale of the map does not admit of giving full value to many important, but minor, features, there is at least no excuse for fundamental errors such as this. The map is certainly not overcrowded with names, and this fact renders it all the more desirable that those which exist should be correct. The "Central Makran" range is an invention which is hardly permissible. Not only is it not near the centre of Makran, but it is doubtful whether it is, all of it, even in Makran. As regards the frontier, we must, however, be thankful for small mercies. It is something to find a map of Baluchistan which is correct in its political boundaries, and it is a great deal to find a map of Afghanistan which is in almost every respect a far better illustration of the country it represents than that which we have just criticised.

The city maps at the end of the series are wholly admirable, and so are the railway maps which precede them. It would have added greatly to the interest of the series could we have had maps of some of the most ancient, and, historically, the most important, of the cities of the past; Chitor, Ujjain, Udaipur, and many another that we could mention, will always possess an undying interest for the student of India. On the whole, this atlas is an admirable addition to the "Gazetteer," and as it is probably the most useful volume for reference in the whole series, so may we hope that in due time it will become the most accurate.

T. H. H.

ESSAYS ON LEONARDO DA VINCI.

Etudes sur Léonard de Vinci, ceux qu'il a lus et ceux qui l'ont lu. By Pierre Duhem. Seconde Série. Pp. iv+474. (Paris: A. Hermann, 1909.) Price 15 francs.

THIS volume contains four essays, on Leonardo da Vinci's views on the infinitely great and the infinitely small, on his ideas on the plurality of worlds, on his dependence on the philosophy of Nicolaus de Cusa, and on his ideas on the origin of fossils.

When endeavouring to estimate the value of the notes and jottings of the great painter it is necessary to consider the books accessible to him and the problems under discussion among philosophers of his day. M. Duhem has made a detailed study of the works of mediæval thinkers, and he traces the development of the ideas by which Leonardo's mind was influenced, and the advances he made, by which, unfortunately, the world did not profit since they remained locked up in his note-books. The foundation on which every speculation rested was still the philosophy of Aristotle, viewed in many cases through the spectacles of the scholastics, and often influenced by the commentaries of Arabian philosophers. But Leonardo reasoned independently on every subject, and though he often adopted opinions held by his predecessors, he never followed slavishly in their footsteps. This is well illustrated by his attitude with regard to the question whether there might be more worlds than the one of which the earth was the central part, and which was bounded by the starry sphere. Aristotle had denied that there could be more than one universe, because a body can only be at rest in its natural place, so that the earth of a second world would fall down on our earth, and no body can therefore exist outside the starry sphere. The question was a difficult one to the scholastics, because to deny the possibility of the plurality of worlds seemed to involve denying the omnipotence of God; but a curious compromise was proposed by Albert of Saxony, that if there were another world it would have to be concentric with ours, because the centres of gravity of our earth and the other one would have to coincide if there were to be equilibrium, and this could only be the case if the other earth were in the form of a spherical shell—unless we assume a permanent miracle. Undeterred by this, Leonardo in a note considers what would happen if there were, not one, but two centres of gravity. He assumes two worlds of equal size and a heavy body outside the line joining their centres, but at equal distances from these; and he asks how will this body move and where will it come to rest? The answer is that it will move along the perpendicular to the line joining the centres, and be in equilibrium at the point midway between them. Here, as in many other places, he shows that he had